

A new species of *Trigonocera* (Diptera: Dolichopodidae, Diaphorinae) from China with an updated key to species worldwide

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Abstract: The Old World genus *Trigonocera* is a small group with only nine extant species described. Here we report a new species *Trigonocera shuensis* Liu & Yang sp. nov., which is found in Oriental China. An updated key to the species in this genus is provided.

Key words: Empidoidea; Dolichopodidae; taxonomy; key

三角长足虻属分种检索表并记一新种（双翅目：长足虻科）

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摘要：分布于旧世界的三角长足虻属 *Trigonocera* 仅知 9 个现生种，本文报道了来自东洋区的 1 新种：蜀三角长足虻 *Trigonocera shuensis* Liu & Yang sp. nov.，并提供了特征图；修订了该属的检索表。

关键词：舞虻总科；长足虻科；分类；检索表

Introduction

The genus *Trigonocera* is distributed in the Old World with only nine extant species described, of which four species are from the Afrotropical Realm, five from the Oriental Realm, and one from the Palearctic Realm (Grichanov 2013; Yang *et al.* 2006; Yang *et al.* 2011). A detailed description of the genus was provided by Grichanov (2013). They occur on vegetation around pools and in marshy meadows at riversides within savanna and forest ecoregions (Grichanov & Brooks 2017). This genus is somewhat similar to *Melanostolus* Kowarz and especially *Diaphorus* Meigen. The most important feature of this genus is the first flagellomere being nearly subtriangular and the pedicel forming a thumb-like inner condyle or conus projecting into the base of the first flagellomere. In the remarks of Grichanov (2013), he distinguished *Trigonocera* from other genera for both sexes.

Here we present a new species, *Trigonocera shuensis* Liu & Yang sp. nov. from Oriental China and provide an updated key to the ten known species of *Trigonocera*. The genus

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Trigonocera is reported from Chongqing, Sichuan and Xizang of China for the first time.

Material and methods

The specimens on which this study is based were collected from Oriental China (Chongqing, Guizhou, Sichuan, Xizang) using sweep nets. The specimens were stored in 75% ethanol.

All species were deposited in the Entomological Museum of China Agricultural University (CAU), Beijing.

Morphological terminology for adult structures mainly follows McAlpine (1981). Terms for the structures of the male genitalia follow Cumming and Wood (2009). The body length was measured from the insertion of the antenna to the apex of the genitalia in males. The following abbreviations are used: acr — acrostichal bristle, ad — anterodorsal bristle, av — anteroventral bristle, d — dorsal bristle, dc — dorsocentral bristle, h — humeral bristle, LI — fore leg, LII — mid leg, LIII — hind leg, npl — notopleural bristle, oc — ocellar bristle, pd — posterodorsal bristle, v — ventral bristle, CuAx ratio — length of m-cu / length of distal portion of CuA.

Taxonomy

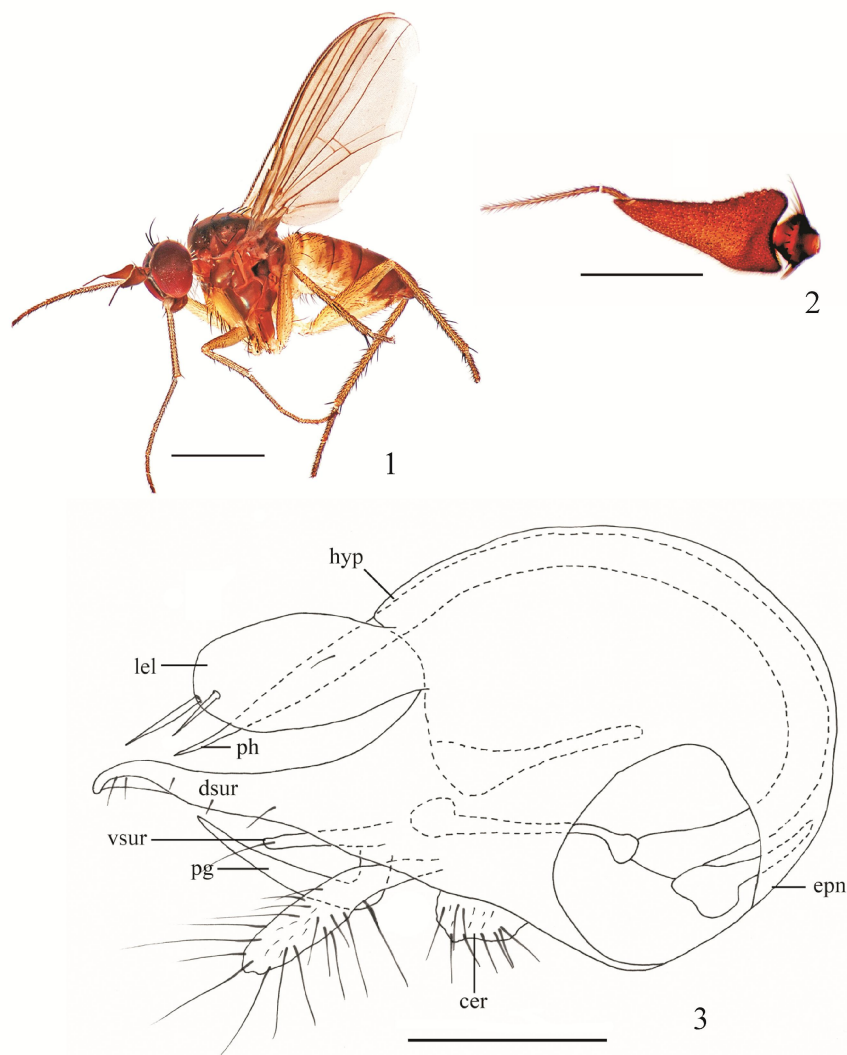
Key to species of *Trigonocera* (males) (modified from Grichanov 2013)

1. First three abdominal terga mostly yellow.....2
- . Abdomen entirely dark, usually black-green, sometimes with yellow lateral spots on 1st and 2nd terga.....3
2. Fore tarsus with claws and small pulvilli; mesonotum matte grey, densely pollinose; frons matte brown-green, densely pollinose; 2.7–3.0 mm [Oriental: China (Taiwan), Laos, Thailand].....
..... *T. lucidiventris* Becker
- . Fore tarsus without claws, with enlarged pulvilli; mesonotum shining metallic, weakly pollinose; frons shining blue-green; 2.0–2.3 mm [Oriental: Nepal, India (West Bengal)]..... *T. specialis* Becker
3. Femora mostly black to brown4
- . Femora mostly yellow.....5
4. Fore tarsus with 1 claw; 3.0–3.5 mm (Afrotropical: DR Congo, Ethiopia, Kenya, Namibia, South Africa, Swaziland)..... *T. munroi* (Curran)
- . Fore tarsus without claws; 3.6 mm (Afrotropical: Ethiopia)..... *T. ethiopiensis* Grichanov
5. Frons narrower than face; palpus dark brown; mid and hind coxae blackish..... 6
- . Frons wider than face; palpus yellow; mid and hind coxae various.....7
6. Hind femur entirely yellow; first flagellomere as long as high at base; 2.5 mm [Oriental: China (Hainan)].....
..... *T. tongshiensis* (Yang)
- . Hind femur with blackish apex; first flagellomere 2 times longer than high at base; 2.5–5.2 mm [Oriental: China (Chongqing, Guizhou, Xizang, Yunnan)]..... *T. guizhouensis* Wang, Yang & Grootaert
7. Fore tarsus without claws, with enlarged pulvilli; 3.5 mm (Afrotropical: Madagascar).....
..... *T. madagascarensis* Grichanov
- . Fore tarsus with claws and small pulvilli.....8
8. Hind coxa yellow, at most dark at base; hind trochanter and femur yellow; 2.5–3.0 mm [Palearctic: Egypt, Israel; Afrotropical: Botswana, Cape Verde, Namibia, Senegal, Zambia; Oriental: China (Taiwan), Thailand]

- *T. rivos*a Becker
 -. Hind coxa brown-black, others various 9
 9. Mid tibia with two pairs of d; hind tibia with two–three short bristles; 2.5–3.0 mm (Oriental: Indonesia, Myanmar)..... *T. obscura* De Meijere
 -. Mid tibia with two ad, three pd and two pv; hind tibia with three–five ad and five–six weak pv; 2.4–2.6 mm [Oriental: China (Chongqing, Sichuan)]..... *T. shuensis* Liu & Yang **sp. nov.**

1. ***Trigonocera guizhouensis* Wang, Yang & Grootaert, 2008 (Figs. 1–3)**

Trigonocera guizhouensis Wang, Yang & Grootaert, 2008: 255. Type location: China, Guizhou, Xishui.



Figures 1–3. *Trigonocera guizhouensis* Wang, Yang & Grootaert, 2008, ♂. 1. Habitus, lateral view; 2. First flagellomere, lateral view; 3. Genitalia, lateral view. Scale bars = 1 mm (Fig. 1); 0.2 mm (Fig. 2); 0.1 mm (Fig. 3). Abbreviations: cer – cercus, dsur – dorsal surstylus, epn – epandrium, hyp – hypandrium, lel – lateral epandrial lobe, ph – phallus, pg – postgonite, vsur – ventral surstylus.

Specimens examined. 6♂, **China**, Guizhou, Libo, Banzhai Village core zone, 25°14'7.37"N, 108°01'46.71"E, 13-X-2013, leg. Ding YANG; 1♂, **China**, Xizang, Bayi Town, Gadinggou, 29°45'31.57"N 94°10'7.59"E, 15-VII-2013, leg. Xuankun LI; 2♂, **China**, Chongqing, Liangping, Daheba Reservoir, 30°29'22.24"N, 107°47'33.75"E, 10-VIII-2012, leg. Zhifei LI.

Distribution. China (Chongqing, Guizhou, Xizang, Yunnan).

Diagnosis. First flagellomere 2.0 times longer than high at base (Fig. 2). Seven–eleven irregularly paired acr. Legs mainly yellow; fore coxa yellow with dark brown base, mid and hind coxae dark brown; hind femur with blackish apex; all tarsomeres V dark brown (Fig. 1). CuAx ratio 0.48.

Remarks. In the original description, the species has ten–eleven irregularly paired acr. But when we examined one specimen from Guizhou, there were only seven paired acr. The body length of the specimens examined in this study is 2.5–3.0 mm, which is much smaller than what was described by Wang, Yang & Grootaert, 2008.

2. *Trigonocera shuensis* Liu & Yang sp. nov. (Figs. 4–7)

Description. Male (Fig. 4). Body length 2.4–2.6 mm, wing length 2.1–2.3 mm.

Head metallic green with pale gray pollinosity; frons wide, shining metallic green, two sides parallel; face slightly narrower than frons (Fig. 7). Hairs and bristles on head black; postocular bristles (including postero-ventral hairs) black. Antenna black, first flagellomere nearly subtriangular, hind margin deeply sunken, length approximately as long as wide; arista black, short, pubescent. Proboscis brown with pale hairs; palpus yellow with two black bristles.

Thorax metallic green with pale gray pollinosity. Hairs and bristles on thorax black; five strong dc, eight–nine irregularly paired acr short and hair-like; scutellum with two pairs of bristles, sc thick and long, lsc short and hair-like; proepisternum with one long black bristle on lower part and one short black bristle on upper part.

Legs mainly yellow; fore coxa yellow with brown base, mid and hind coxae brown with somewhat yellow apex; fore and mid tarsi from tip of tarsomere I onward brown, hind tarsus from base of tarsomere I onward brown. Hairs and bristles on legs black. Fore and mid coxae with rows of anterior bristles and long hairs, hind coxa with one outer bristle at base. Hind trochanter with one bristle in the middle. Femora without obvious bristle, hairs at apex of all femora somewhat long. Fore tibia with two ad at basal 1/4 and 1/2, two pd at basal 1/4 and 1/2 respectively; apically with four weak bristles. Mid tibia with two ad at basal 1/4 and 1/2, two pd at basal 1/5 and 1/4, two pv at basal 1/3 and 2/3; apically with three–four bristles. Hind tibia with three–five ad, five–six weak pv; apically with two–four bristles. All legs with two claws and pulvilli shorter than tarsomere V. Relative length of tibia and five tarsomeres of legs LI : 6.3 : 4.0 : 1.8 : 1.5 : 1.1 : 1.0 ; LII : 8.4 : 5.0 : 2.6 : 1.8 : 1.2 : 1.0 ; LIII : 10.0 : 3.5 : 3.3 : 1.9 : 1.5 : 1.1 .

Wing hyaline; veins blackish, C reaching M_{1+2} , R_{4+5} and M parallel apically; CuAx ratio 0.4. Squama pale yellow with black hairs. Halter pale yellow.

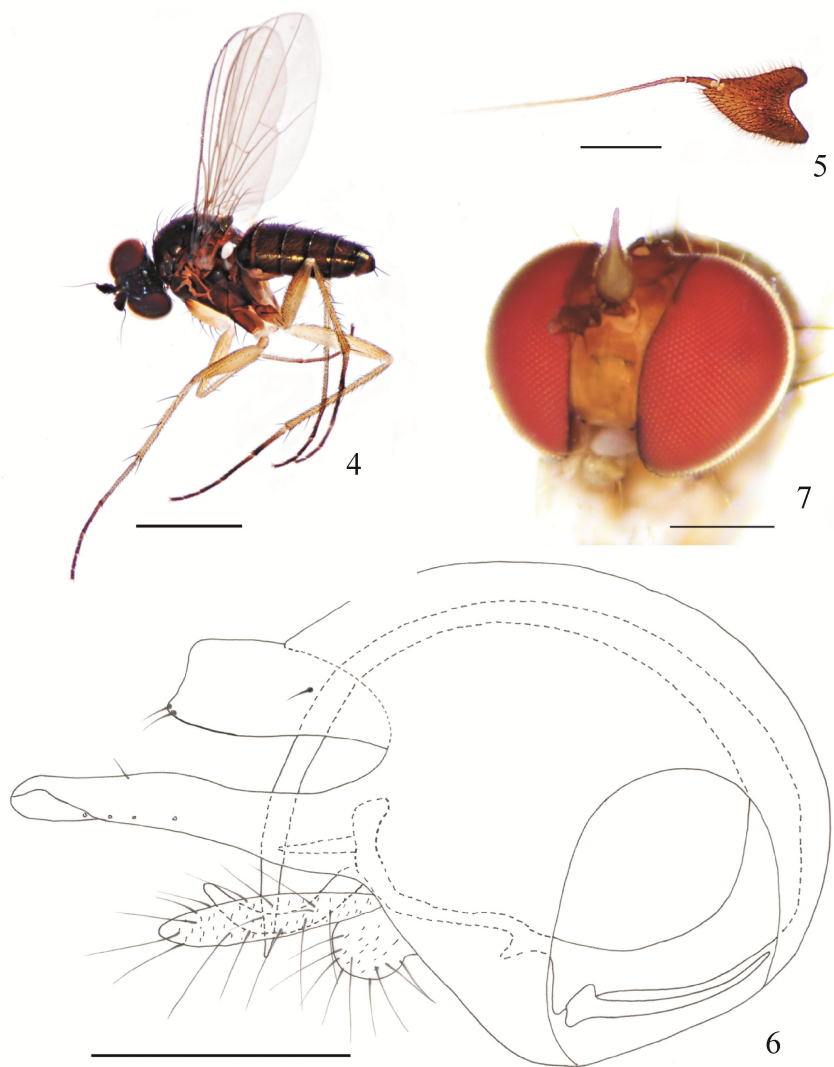
Abdomen metallic green with pale gray pollinosity; hairs and bristles on abdomen black. Terga 1–5 with bristles on posterior margin, tergum 6 bare. Sternum 8 with four strong bristles. Male genitalia (Fig. 6). Lateral epandrial lobe wide and long, apex bearing two bristles.

Ventral surstylus straight and somewhat curved apically. Cercus nearly semicircular with long and thick ventral lobe. Hypandrium with acute end. Apex of phallus thin.

Female. Unknown.

Holotype. ♂, **China**, Sichuan, Sundao of Leshan, 29°32'51.76"N, 103°45'39.50"E, 16-VIII-2009, leg. Yan LI. **Paratypes.** 2♂, **China**, Sichuan, Sundao of Leshan, 29°32'51.76"N, 103°45'39.50"E, 16-VIII-2009, leg. Yan LI; 1♂, Chongqing, Liangping Luojiashaba, 30°37'22.46"N, 107°36'2.41"E, 11-VIII-2012, leg. Zhifei LI.

Distribution. China (Chongqing, Sichuan).



Figures 4–7. *Trigonocera shuensis* Liu & Yang sp. nov., holotype, ♂. 4. Habitus, lateral view; 5. First flagellomere, lateral view; 6. Genitalia, lateral view; 7. Head, anterior view. Scale bars = 1 mm (Fig. 4); 0.2 mm (Figs. 5, 7); 0.1 mm (Fig. 6).

Diagnosis. Frons wider than face. First flagellomere nearly subtriangular, hind margin deeply sunken, approximately as long as wide. Fore tibia with two ad and two pd; mid tibia with two ad, three pd and two pv (Fig. 5).

Remarks. This new species is similar to *Trigonocera tongshiensis* (Yang, 2002) in having the similar first flagellomere nearly subtriangular and similar male genitalia, but can be separated from the latter by the frons wider than face and the hind margin of the first flagellomere deeply sunken. In *T. tongshiensis*, the frons is narrower than face, and the hind margin of the first flagellomere is at most slightly sunken (Yang 2002).

Etymology. The name “shu” refers to the short name for the type location Sichuan.

3. *Trigonocera tongshiensis* (Yang, 2002) (Fig. 8)

Diaphorus tongshiensis Yang, 2002: 746. Type location: China, Hainan, Tongshi.

Trigonocera tongshiensis (Yang): Wang, Yang & Grootaert, 2008: 257.

Diagnosis. The first flagellomere is as long as wide (Fig. 8). Legs mainly yellow; mid and hind coxae pale blackish. CuAx ratio 0.4.

Distribution. China (Hainan).

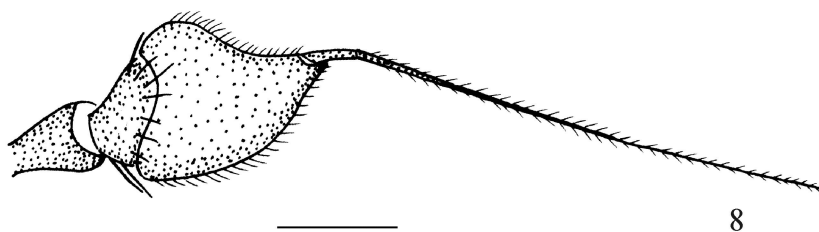


Figure 8. *Trigonocera tongshiensis* (Yang, 2002), antenna, lateral view. Scale bar = 0.2 mm.

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References

- Cumming JM & Wood DM. 2009. Adult morphology and terminology. In: Brown BV, Borkent A, Cumming JM, Wood DM, Woodley NE & Zumbado MA (Eds.), *Manual of Central American Diptera, Volume 1*. NRC Research Press, Ottawa, pp. 9–50.
- Grichanov IY. 2013. Species of the genus *Trigonocera* Becker (Diptera: Dolichopodidae). *Journal of Insect Biodiversity*, 1(6): 1–14.
- Grichanov IY & Brook SE. 2017. Dolichopodidae (Long-legged Dance Flies). Chapter 56. In: Kirk-Spriggs

- AH & Sinclair BJ (Eds.), *Manual of Afrotropical Diptera, Volume 2*. Sanbi Bookshop, Pretoria, pp. 1265–1318.
- McAlpine JF. 1981. Morphology and terminology - Adults. Chapter 2. In: McAlpine JF, Peterson BV, Shewell GE, Teskey HJ, Vockeroth JR & Wood DM (Eds.), *Manual of Nearctic Diptera, Volume 1*. Biosystematics Research Center, Ottawa, pp. 9–63.
- Wang MQ, Yang D & Grootaert P. 2008. New species of Dolichopodidae (Diptera) from China. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Entomologie*, 78: 251–257.
- Yang D. 2002. Diptera: Therevidae, Dolichopodidae. In: Huang FS (Ed.), *Forest Insects of Hainan*. Science Press, Beijing, pp. 741–749.
- Yang D, Zhang LL, Wang MQ & Zhu YJ. 2011. *Fauna Sinica Insecta Vol. 53. Diptera Dolichopodidae*. Science Press, Beijing, 1912 pp.
- Yang D, Zhu YJ, Wang MQ & Zhang LL. 2006. *World Catalog of Dolichopodidae (Insecta: Diptera)*. China Agricultural University Press, Beijing, 704 pp.